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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/015,863      | 12/12/2001  | Willibord A. Grotten | CDT 1756-2          | 2592             |

7590 05/08/2003

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[REDACTED] EXAMINER

ARNOLD JR, JAMES

| ART UNIT | PAPER NUMBER |
|----------|--------------|
|          | 1764         |

DATE MAILED: 05/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

|                   |                      |  |
|-------------------|----------------------|--|
| Application No.   | Applicant(s)         |  |
| 10/015,863        | GROTN, WILLIBRORD A. |  |
| Examiner          | Art Unit             |  |
| James Arnold, Jr. | 1764                 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

1) Responsive to communication(s) filed on 12 December 2001.

2a) This action is **FINAL**.      2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

4) Claim(s) 1-11 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1-11 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some \* c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a)  The translation of the foreign language provisional application has been received.

15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachments(s)

|                                                                                                              |                                                                             |
|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                  | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>2</u> . | 6) <input type="checkbox"/> Other: _____.                                   |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatanaka et al. (EP 0 725 126) in view of Audeh et al. (USPN 4,265,735) and Putman (USPN 6,231,752).

The Hatanaka reference discloses a process for desulfurizing catalytically cracked gasoline comprising separating the catalytically cracked gasoline into at least one of a fraction that has a high content of a single or a plurality of sulfur compounds that are difficult to desulfurize and a fraction that has a high content of a single or a plurality of sulfur compounds that are easy to desulfurize, subjecting at least one of the fractions to hydrodesulfurization under optimum conditions, and mixing the fractions. See Page 3, lines 4-8. The reference discloses the boiling point of the light fraction from about 30 to about 180 C (86 F to 356 F) and the boiling

point of the heavy fraction being from about 80 to 250 C (176 F to 482 F). See Page 3, lines 18-19.

The reference does not disclose a desulfurization process comprising the steps of separating the full boiling range cracked naphtha stream into three fractions comprising a light cracked naphtha fraction, an intermediate cracked naphtha fraction, and a heavy cracked naphtha; subjecting the heavy cracked naphtha to hydrodesulfurization in a first hydrodesulfurization reactor containing a hydrodesulfurizaton catalyst; and combining the effluent from the first hydrodesulfurization reactor with the intermediate cracked naphtha and subjecting the combined stream to hydrodesulfurization in a second hydrodesulfurization reactor. The reference does not disclose a process wherein light cracked naphtha contains substantially all of the mercaptans and is subjected to a wet caustic wash process wherein the mercaptans contained therein are converted to sulfides and said sulfides are removed. The reference does not disclose a process wherein the intermediate cracked naphtha contains mercaptans and substantially all of the thiophenes and substantially all of said mercaptans and thiophenes are converted to hydrogen sulfide in a second hydrodesulfurization reactor. The reference does not disclose a process wherein said heavy cracked naphtha contains thiophenes and substantially all of said other organic sulfur compounds and a portion of said thiophenes and other organic sulfur compounds are converted to hydrogen sulfide in said first hydrodesulfurization reactor. The reference does not disclose a process wherein substantially all of the remaining thiophenes and other organic sulfur compounds are converted to hydrogen sulfide in said second hydrodesulfurization reactor. The reference does not disclose a process wherein the full boiling range cracked naphtha stream is first subjected to thioetherification in a thioetherification reactor

prior to separating the full boiling range cracked naphtha stream into said three fractions, wherein substantially all of said mercaptans are reacted with a portion of said diolefins to form sulfides. The reference does not disclose a process wherein said sulfides are removed in said heavy cracked naphtha and substantially all of said sulfides are converted to hydrogen sulfide in said first hydrodesulfurization reactor. The reference does not disclose a process wherein the remaining sulfides are converted to hydrogen sulfide in said second hydrodesulfurization reactor. The reference does not disclose a process wherein the intermediate cracked naphtha fraction boils in the range of about 150 to 250 F.

The Audeh reference discloses a wet caustic wash of a hydrocarbon stream wherein the mercaptans contained therein are converted to sulfides and said sulfides are removed. See Column 12, lines 17-40. The Putman reference discloses the thioetherification of a full boiling range cracked naphtha stream. See Column 2, lines 39-45 and Column 5, lines 45-46.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Hatanaka to include a wet caustic wash of a hydrocarbon stream wherein the mercaptans contained therein are converted to sulfides and said sulfides are removed because both the Audeh and Hatanaka references disclose removal of impurities from hydrocarbon streams. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the process of Hatanaka to include the thioetherification of a full boiling range cracked naphtha stream because both the Hatanaka reference and the Putman reference disclose removal of impurities from hydrocarbon streams and thioetherification allows for conversion of mercaptans to sulfides. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a

desulfurization process comprising the steps of separating the full boiling range cracked naphtha stream into three fractions comprising a light cracked naphtha fraction, an intermediate cracked naphtha fraction, and a heavy cracked naphtha; subjecting the heavy cracked naphtha to hydrodesulfurization in a first hydrodesulfurization reactor containing a hydrodesulfurizaton catalyst; and combining the effluent from the first hydrodesulfurization reactor with the intermediate cracked naphtha and subjecting the combined stream to hydrodesulfurization in a second hydrodesulfurization reactor because the Hatanaka reference discloses separating gasoline into a plurality of fractions and mixing the fractions. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the full boiling range cracked naphtha stream is first subjected to thioetherification in a thioetherification reactor prior to separating the full boiling range cracked naphtha stream into said three fractions, wherein substantially all of said mercaptans are reacted with a portion of said diolefins to form sulfides; wherein said sulfides are removed in said heavy cracked naphtha and substantially all of said sulfides are converted to hydrogen sulfide in said first hydrodesulfurization reactor; wherein the remaining sulfides are converted to hydrogen sulfide in said second hydrodesulfurization reactor; and wherein the intermediate cracked naphtha fraction boils in the range of about 150 to 250 F because the reference discloses separating gasoline into a plurality of fractions and mixing the fractions; the reference discloses diverse constituent components for gasoline and varied boiling points; and because sulfides removed through thioetherification are higher boiling and can be removed with a heavier naphtha fraction. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a process wherein the intermediate cracked naphtha contains mercaptans and

substantially all of the thiophenes and substantially all of said mercaptans and thiophenes are converted to hydrogen sulfide in a second hydrodesulfurization reactor; wherein said heavy cracked naphtha contains thiophenes and substantially all of said other organic sulfur compounds and a portion of said thiophenes and other organic sulfur compounds are converted to hydrogen sulfide in said first hydrodesulfurization reactor; and wherein substantially all of the remaining thiophenes and other organic sulfur compounds are converted to hydrogen sulfide in said second hydrodesulfurization reactor because the reference discloses diverse constituent components of gasoline and hydrodesulfurization of gasoline.

*Conclusion*

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Podrebarac et al (USPN 6,444,118); Podrebarac (USPN 6,495,030); Carr (USPN 5,169,516); Frey (USPN 5,759,386); Frey (USPN 5,851,383); and Frey et al. (USPN 5,659,106). The Podrebarac references disclose processes for reducing sulfur content in full boiling range naphtha streams. The Carr reference discloses the caustic washing of mercaptans. The Frey references disclose thioetherification and hydrodesulfurization processes.

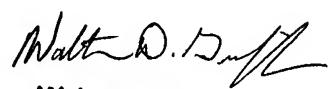
Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Arnold, Jr. whose telephone number is 703-305-5308. The examiner can normally be reached on Monday-Thursday 8:30 AM-6:00 PM; Fridays from 8:30 AM-5:00 PM with alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Calderola can be reached on 703-308-6824. The fax phone numbers for the

organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0651.

ja  
May 5, 2003

  
Walter D. Griffin  
Primary Examiner